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Job No.: CTCE/BBMP/KRIDL/W.No.02/DBM/Bitumen/2017-18 27.04.2017

TEST REPORT ON BITUMEN CONTENT AFTER GRADATION OF DENSE GRADED BITUMINOUS MACADAM MIX

* Customer	:	Asst. Executive Engineer, Yelahanka Sub Division, BBMP, Bangalore.
* Agency	:	Technical Manager (West), KRIDL, Bangalore.
* Name of the Work	:	Providing Asphalting to Nagenahalli Main and Cross roads in Ward No.02 of Yelahanka Sub Division, BBMP, Bangalore..
* Reference	:	BBMP/EE(YNK.D)/W.O/136/2016-17 Dated: 31.03.2017
* Sample ID	:	Asphalting to roads in Nagenahalli, Ward No.02.
Technical Reference	:	IS 2386 and IRC:SP:11-1984
Date of Testing	:	27.04.2017

GRADATION AFTER EXTRACTION

Sieve Size in mm	Trail 1				Specified Limits as per MORTH specification table 500-10 (Grading-2)
	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	
37.5	0	0	0	100	100
26.5	34.25	7.17	7.17	92.83	90 - 100
19	88.69	18.55	25.72	74.28	71 - 95
13.2	66.35	13.88	39.60	60.40	56 - 80
4.75	88.25	18.46	58.06	41.94	38 - 54
2.36	43.36	9.07	67.13	32.87	28 - 42
0.3	86.36	18.07	85.20	14.80	7 - 21
0.075	132.6	27.74	94.87	5.13	2 - 8

Sieve Size in mm	Trail 2				Specified Limits as per MORTH specification table 500-10 (Grading-2)
	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	
37.5	0	0	0	100	100
26.5	34.25	7.20	7.20	92.80	90 - 100
19	89.69	18.84	26.04	73.96	71 - 95
13.2	75.56	15.87	41.91	58.09	56 - 80
4.75	85.65	17.99	59.91	40.09	38 - 54
2.36	43.36	9.11	69.01	30.99	28 - 42
0.3	79.69	16.74	85.76	14.24	7 - 21
0.075	116.5	24.47	93.49	6.51	2 - 8

* Information is furnished by the Customer/Representative

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Job No.: CTCE/BBMP/KRIDL/W.No.02/DBM/Agg/2017-18

27.04.2017

TEST REPORT ON GRADATION FOR AGGREGATES

* Customer	:	**Asst. Executive Engineer,** Yelahanka Sub Division, BBMP, Bangalore.
* Agency	:	**Technical Manager (West),** KRIDL, Bangalore.
* Name of the Work	:	Providing Asphalting to Nagenahalli Main and Cross roads in Ward No.02 of Yelahanka Sub Division, BBMP, Bangalore.
* Reference	:	BBMP/EE(YNK.D)/W.O/136/2016-17 Dated: 31.03.2017
* Sample ID	:	Hot Mix Plant, Bangalore
Technical Reference	:	IS : 2386(Part -1)-1963 (RA-2011)
* Type of Mix	:	Dense Graded Bituminous Macadam
Date of Testing	:	27.04.2017

Total Weight of Sample: **14150** gm

Sieve Size, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Grade-II As per MORTH	Remarks
37.50	0	0.0	0	100	100	Gradation satisfies Grade II MORTH Table 500-10 specification
26.50	835	5.9	5.90	94.10	90 - 100	
19.00	2490	17.6	23.50	76.50	71 - 95	
13.20	2125	15.0	38.52	61.48	56 - 80	
4.75	2890	20.4	58.94	41.06	38 - 54	
2.36	1530	10.8	69.75	30.25	28 - 42	
0.300	2355	16.6	86.40	13.60	7 - 21	
0.075	1070	7.6	93.96	6.04	2 - 8	

Total Weight of Sample: **14150** gm

Sieve Size, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Grade-II As per MORTH	Remarks
37.5	0	0.0	0	100	100	Gradation satisfies Grade II MORTH Table 500-10 specification
26.5	885	6.3	6.25	93.75	90 - 100	
19	2430	17.2	23.43	76.57	71 - 95	
13.2	2590	18.3	41.73	58.27	56 - 80	
4.75	2560	18.1	59.82	40.18	38 - 54	
2.360	1530	10.8	70.64	29.36	28 - 42	
0.300	2515	17.8	88.41	11.59	7 - 21	
0.075	1025	7.2	95.65	4.35	2 - 8	

* Information is furnished by the Customer/Representative

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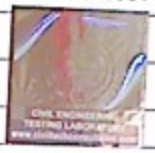
Job No.: CTCE/BBMP/KRIDL/W.No.02/DBM/Stability/2017-18 27.04.2017

TEST REPORT ON MARSHALL STABILITY OF MIX

* Customer	:	**Asst. Executive Engineer,** Yelahanka Sub Division, BBMP, Bangalore.
* Agency	:	**Technical Manager (West),** KRIDL, Bangalore.
* Name of the Work	:	Providing Asphalting to Nagenahalli Main and Cross roads in Ward No.02 of Yelahanka Sub Division, BBMP, Bangalore.
* PMC Reference	:	BBMP/EE(YNK.D)/W.O/136/2016-17 Dated: 31.03.2017
Source / location	:	Hot mix Plant, Bangalore
* Type of Mix	:	Dense Graded Bituminous Macadam
Date of Testing	:	27.04.2017



The results of the tests conducted on the Dense Graded Bituminous Macadam sample are as follows:

Sl. No	Description	Test Result 1	Test Result 2	Requirement as per MORTH (Table 500-11)
1	Marshall Stability, Kn	9.30	9.40	9 Kn (min)
2	Marshall flow, mm	2.45	3.20	2 – 4
3	Percent air voids in Mineral Aggregate	3.40	4.40	3 – 6
4	Voids in Compacted Mix	11.50	12.65	11 – 13
5	Percent Voids filled with Bitumen	66.45	67.50	65 - 75
6	Density, g/cc	2.27	2.28	--

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Job No.: CTCE/BBMP/KRIDL/W.No.02/CSR-04/310f/QB(BC)/2017-18 26.04.2017

TEST REPORT ON DETERMINATION OF BITUMEN CHARACTERISTICS

* Customer	:	**Asst. Executive Engineer,** Yelahanka Sub Division, BBMP, Bangalore.
* Agency	:	**Technical Manager (West),** KRIDL, Bangalore.
* Name of work	:	Providing Asphalting to Nagenahalli Main and Cross roads in Ward No.02 of Yelahanka Sub Division, BBMP, Bangalore.
* PMC Reference	:	BBMP/EE(YNK.D)/W.O/136/2016-17 Dated: 31.03.2017
* Sample ID	:	Bitumen
Source/ Location	:	Hot Mix Plant, Bangalore.
Sample Received on	:	24.04.2017
Period of Testing	:	26.04.2017

The results of the tests conducted on the bitumen sample are as follows:

Sl. No	Description	Test Method as per IS	Test Result	Requirement as per IS:73:2013
1	Penetration at 25 ^{0}C, 1/10 mm	IS :1203 -1978 (RA-2014)	82	80 to 100
2	Softening point, ^{0}C	IS :1205 -1978 (RA-2014)	44	Min. 40
3	Ductility at 27^{0}C, cm	IS :1208 -1978 (RA-2014)	100 >	Min. 75
4	Flash Point, ^{0}C	IS :1209 -1978 (RA-2014)	296	Min. 220

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VIDYARANI P.K.
Technical Manager

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Job No.: CTCE/BBMP/KRIDL/W.No.02/BC/AIV/2017-18

26.04.2017

TEST REPORT ON IMPACT VALUE OF AGGREGATES

* Customer	:	**Asst. Executive Engineer,** Yelahanka Sub Division, BBMP, Bangalore.
* Agency	:	**Technical Manager (West),** KRIDL, Bangalore.
* Name of Work	:	Providing Asphalting to Nagenahalli Main and Cross roads in Ward No.02 of Yelahanka Sub Division, BBMP, Bangalore.
* Reference	:	BBMP/EE(YNK.D)/W.O/136/2016-17 Dated: 31.03.2017
* Sample ID	:	Hot mix plant, Bangalore.
* Type of Mix	:	Bituminous Concrete
Technical Reference	:	IS: 2386 (Part- 4)-1963 (RA-2011)
Date of Testing	:	26.04.2017

Sl No.	Details	Trial No.		Average
		1	2	
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	380	383	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	81	82	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	299	301	
4	Aggregate Impact value = percent fines 100* (W2/W1) percent	21.32	21.41	21.36

*Information is furnished by the Customer/Representative.

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Comments:

→ Maximum allowable Aggregate Impact value for Bituminous Concrete is 24%

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Job No.: CTCE/BBMP/KRIDL/W.No.02/BC/Shape.T/2017-18 26.04.2017

TEST REPORT ON FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

* Customer	:	**Asst. Executive Engineer,** Yelahanka Sub Division, BBMP, Bangalore.
* Agency	:	**Technical Manager (West),** KRIDL, Bangalore.
* Name of Work	:	Providing Asphalting to Nagenahalli Main and Cross roads in Ward No.02 of Yelahanka Sub Division, BBMP, Bangalore.
* Reference	:	BBMP/EE(YNK.D)/W.O/136/2016-17 Dated: 31.03.2017
* Sample ID	:	Hot mix plant, Bangalore
Technical Reference	:	IS : 2386(Part -1)-1963 (RA-2011)
* Type of Mix	:	Bituminous Concrete
Date of Testing	:	26.04.2017

Sl.No.	Description	Result
1	Flakiness Index	11.50%
2	Elongation Index	13.28%
3	Combined Flakiness & Elongation Index	24.78%

*Information is furnished by the Customer/Representative.

Comments:

→ Maximum allowable Flakiness & Elongation Index for Bituminous Concrete is 30%

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Job No.: CTCE/BBMP/KRIDL/W.No.02/BC/Stripping/2017-18

27.04.2017

TEST REPORT ON STRIPPING VALUEOF ROAD AGGREGATES (STATIC IMMERSION TEST)

* Customer	:	Asst. Executive Engineer, Yelahanka Sub Division, BBMP, Bangalore.
* Agency	:	Technical Manager (West), KRIDL, Bangalore.
* Name of Work	:	Providing Asphalting to Nagenahalli Main and Cross roads in Ward No.02 of Yelahanka Sub Division, BBMP, Bangalore.
* Reference	:	BBMP/EE(YNK.D)/W.O/136/2016-17 Dated: 31.03.2017
Technical Reference	:	IS: 6241
* Type of Mix	:	Bituminous Concrete
Date of Testing	:	27.04.2017

Type of binder : 80/100
Percentage of binder used : 5.00% by wt.
Total weight of aggregate : 200 g
Total weight of binder : 10.00 g
Temperature of water-bath : 40° C

Observation Number	Stripping, Percentage	Average, Percentage	Average Retained Coating, %
1	3.1	3.20	96.80
2	3.2		
3	3.3		

*Information is furnished by the Customer/Representative.

Comments:

→ Minimum allowable Aggregate retained coating for Bituminous Concrete is 95%

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Job No.: CTCE/BBMP/KRIDL/W.No.02/BC/Sp_Wa/2017-18

27.04.2017

TEST REEPORT ON SPECIFIC GRAVITY AND WATER ABSORPTION

* Customer	:	**Asst. Executive Engineer,** Yelahanka Sub Division, BBMP, Bangalore.
* Agency	:	**Technical Manager (West),** KRIDL, Bangalore.
* Name of Work	:	Providing Asphalting to Nagenahalli Main and Cross roads in Ward No.02 of Yelahanka Sub Division, BBMP, Bangalore.
* Reference	:	BBMP/EE(YNK.D)/W.O/136/2016-17 Dated: 31.03.2017
* Sample ID	:	Hot mix plant, Bangalore
Technical Reference	:	IS : 2386(Part -3)-1963 (RA-2011)
* Type of Mix	:	Bituminous Concrete
Date of Testing	:	27.04.2017

Sl. No.	Details	Notation	Test Number			Mean Value
			Test 1	Test 2	Test 3	
1	Weight of aggregate suspended in water with the basket	W_1 g	2002	2004	2005	
2	Weight of basket suspended in water	W_2 g	755	755	755	
3	Weight of saturated aggregate in water	$(W_1 - W_2) = W_s$ g	1239	1238	1250	
4	Weight of saturated surface dry aggregate in air	W_3 g	2008	2009	2010	
5	Weight of water equal to the volume of the aggregate	$(W_3 - W_S)$ g	769	771	760	
6	Weight of oven dried aggregate	W_4 g	2001	2000	1999	
7	Specific Gravity	$W_4/(W_3-W_S)$	2.602	2.594	2.630	2.609
8	Apparent Specific gravity	$W_4/(W_4-W_S)$	2.626	2.625	2.669	2.640
9	Water Absorption	$((W_3-W_4)*100)/W_4$	0.35%	0.45%	0.55%	0.45%

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Comments:

→ Maximum allowable Aggregate Water absorption value for Bituminous Concrete is 2.0%

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Job No: CTCE/BBMP/KRIDL/W.No.02/BC/Bitumen/2017-18

27.04.2017

TEST REPORT ON BITUMEN CONTENT OF BITUMINOUS CONCRETE MIX

* Customer	:	**Asst. Executive Engineer,** Yelahanka Sub Division, BBMP, Bangalore.
* Agency	:	**Technical Manager (West),** KRIDL, Bangalore.
* Name of Work	:	Providing Asphalting to Nagenahalli Main and Cross roads in Ward No.02 of Yelahanka Sub Division, BBMP, Bangalore.
* Reference	:	BBMP/EE(YNK.D)/W.O/136/2016-17 Dated: 31.03.2017
* Sample ID	:	Asphalting to roads in Nagenahalli, Ward No.02.
Technical Reference	:	IRC:SP:11-1984
Date of Testing	:	27.04.2017

BITUMEN CONTENT DETERMINATION

Description	Trail 1	Trail 2
1. Weight of Mixture before Test, g	500	500
2. Weight of Mixture after Test, g	474	473
3. Weight of Asphalt and Mineral matter Extracted, g	-	-
4. Weight of Mineral Matter, g.	-	-
5. Weight of Ash, g		
6. Weight of Bitumen Extracted, g. (corrected)	26	27.00
7. Bitumen content in %	5.20	5.40
8. Average	**5.30**	

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27.04.2017

TEST REPORT ON BITUMEN CONTENT AFTER GRADATION DETERMINATION OF BITUMINOUS CONCRETE MIX

* Customer	:	Asst. Executive Engineer, Yelahanka Sub Division, BBMP, Bangalore.
* Agency	:	Technical Manager (West), KRIDL, Bangalore.
* Name of Work	:	Providing Asphalting to Nagenahalli Main and Cross roads in Ward No.02 of Yelahanka Sub Division, BBMP, Bangalore.
* Reference	:	BBMP/EE(YNK.D)/W.O/136/2016-17 Dated: 31.03.2017
* Sample ID	:	Asphalting to roads in Nagenahalli, Ward No.02.
Technical Reference	:	IS 2386 and IRC:SP:11-1984
Date of Testing	:	27.04.2017

GRADATION AFTER EXTRACTION

Sieve Size in mm	Trail 1				Specified Limits as per MORTH specification table 500-18 (Grading-2)
	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	
19	0	0	0	100	100
13.2	45.15	9.53	9.53	90.47	79-100
9.5	32.25	6.80	16.33	83.67	70-88
4.75	71.23	15.03	31.36	68.64	53-71
2.36	68.56	14.46	45.82	54.18	42-58
1.18	53.26	11.24	57.06	42.94	34-48
0.6	56.35	11.89	68.95	31.05	26-38
0.3	48.26	10.18	79.13	20.87	18-28
0.15	36.65	7.73	86.86	13.14	12-20
0.075	30.25	6.38	93.24	6.76	4-10

Sieve Size in mm	Trail 2				Specified Limits as per MORTH specification table 500-18 (Grading-2)
	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	
19	0	0	0	100	100
13.2	36.35	7.68	7.68	92.32	79-100
9.5	46.32	9.79	17.48	82.52	70-88
4.75	68.25	14.43	31.91	68.09	53-71
2.36	71.22	15.06	46.96	53.04	42-58
1.18	62.32	13.18	60.14	39.86	34-48
0.6	52.12	11.02	71.16	28.84	26-38
0.3	35.12	7.42	78.58	21.42	18-28
0.15	28.56	6.04	84.62	15.38	12-20
0.075	38.56	8.15	92.77	7.23	4-10

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Job No.: CTCE/BBMP/KRIDL/W.No.02/BC/Agg/2017-18

27.04.2017

TEST REPORT ON GRADATION OF AGGREGATE

* Customer	:	**Asst. Executive Engineer,** Yelahanka Sub Division, BBMP, Bangalore.
* Agency	:	**Technical Manager (West),** KRIDL, Bangalore.
* Name of Work	:	Providing Asphalting to Nagenahalli Main and Cross roads in Ward No.02 of Yelahanka Sub Division, BBMP, Bangalore.
* Reference	:	BBMP/EE(YNK.D)/W.O/136/2016-17 Dated: 31.03.2017
* Sample ID	:	Bituminous Concrete
Technical Reference	:	IS : 2386(Part -1)-1963 (RA-2011)
* Type of Mix	:	Hot mix plant, Bangalore
Date of Testing	:	27.04.2017

Total Weight of Sample: **5150** gm

Sieve Size, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	JOBMIX Gradation as per MORTH	Remarks
19	0	0	0	100	100	Gradation satisfies Bituminous concrete Grade-II specification as per `MORTH 500-18
13.2	765	14.85	14.85	85.15	79 - 100	
9.5	525	10.19	25.05	74.95	70 - 88	
4.75	615	11.94	36.99	63.01	53 - 71	
2.36	540	10.49	47.48	52.52	42 - 58	
1.18	525	10.19	57.67	42.33	34 - 48	
0.600	545	10.58	68.25	31.75	26 - 38	
0.300	585	11.36	79.61	20.39	18 - 28	
0.150	360	6.99	86.60	13.40	12 - 20	
0.075	360	6.99	93.59	6.41	4 - 10	

Total Weight of Sample: **5250** gm

Sieve Size, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	JOBMIX Gradation as per MORTH	Remarks
19	0	0	0	100	100	Gradation satisfies Bituminous concrete Grade-II specification as per MORTH 500-18
13.2	615	11.71	11.71	88.29	79 - 100	
9.5	525	10.00	21.71	78.29	70 - 88	
4.75	620	11.81	33.52	66.48	53 - 71	
2.36	590	11.24	44.76	55.24	42 - 58	
1.18	635	12.10	56.86	43.14	34 - 48	
0.600	525	10.00	66.86	33.14	26 - 38	
0.300	585	11.14	78.00	22.00	18 - 28	
0.150	390	7.43	85.43	14.57	12 - 20	
0.075	435	8.29	93.71	6.29	4 - 10	

*Information is furnished by the Customer/Representative.

Note:

⇒The report shall not be reproduced, except in full, without the written approval of the laboratory.
⇒The results indicated above are based on the tests carried out on the samples received in the laboratory.
⇒Any Query regarding the report must be reported within 30 days from the date of testing.

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Job No.: CTCE/BBMP/KRIDL/W.No.02/BC/Stability/2017-18

27.04.2017

TEST REPORT ON MARSHALL STABILITY OF MIX

* Customer	:	**Asst. Executive Engineer,** Yelahanka Sub Division, BBMP, Bangalore.
* Agency	:	**Technical Manager (West),** KRIDL, Bangalore.
*Name of the Work	:	Providing Asphalting to Nagenahalli Main and Cross roads in Ward No.02 of Yelahanka Sub Division, BBMP, Bangalore.
*Reference	:	BBMP/EE(YNK.D)/W.O/136/2016-17 Dated: 31.03.2017
* Source	:	Hot mix Plant, Bangalore
* Type of Mix	:	Bituminous Concrete
Date of Testing	:	27.04.2017

The results of the tests conducted on the Bituminous Concrete mix sample are as follows:

Sl. No	Description	Test Result 1	Test Result 2	Requirement as per MORTH (Table 500-19)
1	Marshall Stability, Kn	9.05	9.20	9 Kn (min)
2	Marshall flow, mm	2.60	3.15	2 – 4
3	Percent air voids in Mineral Aggregate	3.20	4.30	3 – 6
4	Voids in Compacted Mix	13.90	14.05	13 - 15
5	Percent Voids filled with Bitumen	67.25	68.15	65 - 75
6	Density, g/cc	2.26	2.27	--

*Information is furnished by the Customer/Representative.

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